GSC Advanced Research and Reviews

eISSN: 2582-4597 CODEN (USA): GARRC2

Cross Ref DOI: 10.30574/gscarr

Journal homepage: https://gsconlinepress.com/journals/gscarr/

(RESEARCH ARTICLE)

Check for updates

Analysis of factors related to the incident of hypertension in pregnancy

Nurul Haqqi [1], Lorensia Panselina Widowati [2,*], Yosefin Beni Purbo Utami [2], Baharika Suci Dwi Aningsih [2] and Eviyani Margaretha Manungkalit [2]

[1] *Midwifery Study Program, Universitas Respati Indonesia, Jakarta, Indonesia.*
[2] *Midwifery Study Program, STIK Sint Carolus, Jakarta, Indonesia.*

GSC Advanced Research and Reviews, 2024, 20(02), 001–007

Publication history: Received on 20 June 2024; revised on 28 July 2024; accepted on 31 July 2024

Article DOI: https://doi.org/10.30574/gscarr.2024.20.2.0291

Abstract

Introduction: Pregnancy-related hypertension is defined as hypertension that develops during pregnancy, usually in the final month of the pregnancy or after 20 weeks of gestational age that was previously normal. Five to fifteen percent of pregnancy-related problems are caused by hypertension, which is also one of the leading causes of maternal death and morbidity.

Objective: The purpose of this study is to determine how the risk of hypertension during pregnancy is related to maternal age, parity, pregnancy spacing, BMI, junk food consumption habits, and prenatal visits.

Method: Case control research design was employed. Eighty control samples were acquired using a simple random technique, while forty samples from the case group were taken using the accidental technique. A questionnaire was used to collect data. The logistic regression test and the chi square test were used in the data analysis. This study was taken in Ardita's Clinic, Indonesia. This study's sample was taken using the total sampling technique involving 33 respondents.

Result: The incidence of hypertension proved to be significantly correlated ($p<0.05$) with maternal age, junk food consumption, and prenatal visits while parity, pregnancy interval, and BMI weren't associated with a significant correlation ($p>0.05$). The most significant factor is the junk food consumption habit (OR=13.483).

Conclusion: Women should plan their pregnancies at a peak age, avoid from junk food, and arrange many antenatal appointments in order to ensure a successful pregnancy.

Keywords: Hypertension; Pregnancy; Risk factor; High blood pressure; Pregnancy complication

1. Introduction

Maternal Mortality Rate is one of the main parameters of women's health status in a country. According to the SP2020 long form, the maternal mortality rate in Indonesia is 189, meaning that for every 100,000 live births, 189 women will die during pregnancy, childbirth, or the postpartum period. The SDGs goal for 2030, which aims to lower the maternal mortality ratio to fewer than 70 per 100,000 live births, is still far off from this number (1).

Pregnancy can cause health issues for some women. These issues may pertain to the health of the fetus, the mother, or both. Problems might arise even in healthy women who were not sick before becoming pregnant. These issues could turn the pregnancy into a high-risk one. After maternal hemorrhage, HDP are the second most common cause of maternal mortality worldwide. They also significantly increase the morbidity of both mothers and fetuses/offspring in the short and long term (2).

* Corresponding author: Lorensia Panselina Widowati

Hypertensive disorders complicate between 5% and 10% of all pregnancies. Pre-eclampsia complicates 2-8% of all pregnancies worldwide. In the US, the rate of pre-eclampsia increased 25% between 1987-2004. The incidence of hypertension is increasing due to changes in maternal demographics (e.g. advancing maternal age, increased pre-pregnancy weight) (3)(4).

Reduced artery flow from the heart to the body's organs results in high blood pressure, often known as hypertension. The arteries' pressure rises as a result. This can make it more difficult for blood to get to the placenta during pregnancy, which gives the fetus oxygen and nutrition. Lower blood flow can cause the fetus to grow more slowly and increase the mother's risk of premature labor and preeclampsia (5). Pregnant women with high blood pressure will need to keep an eye on it and manage it during their pregnancy, maybe with medication. Gestational hypertension is a term used to describe high blood pressure that occurs during pregnancy. Gestational hypertension usually manifests in the second half of pregnancy and resolves postpartum.

According to ACOG recommendations, after 20 weeks of pregnancy, when blood pressure was previously normal, two consecutive instances at least four hours apart must occur for there to be a diagnosis of gestational hypertension. The blood pressure must be greater than or equal to 140 mmHg systolic or 90 mmHg diastolic. Alternatively, if a patient has a similar pressure after a brief period of time and their systolic blood pressure is greater than 160 mmHg or their diastolic blood pressure is greater than 110 mmHg, it can be determined that the patient has gestational hypertension (6).

In particular, most studies found that a higher risk of developing hypertensive disorders of pregnancy was associated with nulliparity, old age, obesity, family history of hypertension, history of hypertensive disorders of previous pregnancy in multiparous women, personal/family history of chronic hypertension/diabetes mellitus, high energy diet, gestational diabetes, mental stress during pregnancy, long interval between pregnancies, lower socioeconomic status, and inadequate antenatal care (7). This study aims to analyze the risk factors of pregnancy hypertension

2. Material and methods

2.1. Participants

This study contrasts the case group and the control group utilizing the case control method, an analytical survey with a retrospective approach, to ascertain the proportion of events based on exposure or absence history. The Ardita Primary Clinic, which offers services to internal medicine specialists, pediatric illness specialists, dentists, obstetricians, and general patients, is situated in East Jakarta. All pregnant patients (871) who visited the Ardita Clinic in May or June of 2018 made up the study's population. 40 pregnant women with hypertension were included in the case group sample; they were selected by accidental sampling technique. Meanwhile, 80 healthy pregnant women made up the control group sample, which was selected using a simple random sampling technique. This study was approved by the Medicine Health Research Ethics Committee Universitas Respati Indonesia with number of 27/KE/UNR/V/2018.

2.2. Measures and Analysis

Analysis conducted in this study is to determine the relationship of maternal age, parity, birth interval, BMI, junk food consumption habit, and prenatal visits with pregnancy related hypertension. Primary data, collected by researchers via questionnaires from respondents directly, is the sort of data used. Multiple logistic regression and chi square are the statistical tests that are used.

3. Results

Table 1 characteristics of respondents demonstrate that, in both the case group (72.5%) and the control group (90%) of respondents, the majority fall within the non-risk age group of 20–35 years. 52.5% of pregnant women in the control group had primiparous and grande multiparous parity (risky parity), while the majority of pregnant women in the case group, at 57.5%, have multiparous parity (no-risk parity). In both the case group (65%) and the control group (53.8%), the majority of individuals had a risky birth interval. In both categories, most of the responders had a BMI below 23 (both 72.5%). 80% of the case group and 78% of the control group consumed junk food less than four times a month on average. There were still respondents who had fewer prenatal visits than four times throughout pregnancy, but the majority of respondents in both groups likewise had prenatal visits > four times.

Table 1 Bivariate Analysis Result

Variable	Pregnancy related hypertension				Total		p value	OR (95% CI)
	Case group		Control group					
	n	%	n	%	n	%		
Maternal Age								
Risky age	11	27.5	8	10	19	15.8	0.027	3.414 (1.246- 9.350)
No- risk age	29	72.5	72	90	101	84.2		
Parity								
Risky parity	17	42.5	42	52.5	59	49.2	0.401	0.669 (0.311- 1.437)
No- risk parity	23	57.5	38	47.5	61	50.8		
Birth interval								
Risky interval	26	65	43	53.8	69	57.5	0.327	1.598 (0.729- 3.501)
No- risk interval	14	35	37	46.3	51	42.5		
BMI								
>= 23	11	27.5	22	27.5	33	27.5	1.000	1.000 (0.427- 2.340)
<23	29	72.5	58	72.5	87	72.5		
Junk food consumption								
>4 x/month	8	20	2	2.5	10	8.3	0.002	9.750 (1.962- 48.446)
<= 4 x/month	32	80	78	97.5	110	91.7		
Prenatal visits								
< 4x	7	17.5	3	3.8	10	8.3	0.015	5.444 (1.326- 22.359)
>= 4x	33	82.5	77	96.3	110	91.7		
Total	40	100	80	100				

Based on table 1, it reveals that only 10% of mothers who did not have hypertension (controls) were in risky maternal age. In contrast, 27.5% of mothers who suffered from hypertension (cases) were in risky maternal age. Maternal age is related to the incidence of pregnancy hypertension with OR 3.414 (95% CI: 1.246-9.350), meaning mothers whose age is below 20 and more than 35 years have a 3.414 times greater chance of experiencing pregnancy hypertension compared to mothers whose age is between 20 and 35 years. This conclusion is based on the statistical test results, which yielded p value 0.027 using alpha 5% (0.05).

About 52.5% respondents in control group and 42.5% respondents in case group have risky parity. Given that the statistical test produced a p value of 0.401 with an alpha of 5% (0.05), it is possible to conclude that parity has no relationship with the prevalence of hypertension during pregnancy.

The results also show that there were 65% respondent with risky birth interval experience pregnancy related hypertension. Meanwhile, there were also 53.8% respondent in control group which had no risk birth interval experienced hypertension. Using an alpha of 5% (0.05), the statistical test yielded a p value of 0.327. It can be stated that there is no correlation between pregnancy hypertension and birth interval.

In both the case and control groups, there were 27.5% of respondents with a BMI >= 23 and hypertension. Based on the statistical test results, which have a p value of 1,000, it can be said that there is no correlation between pregnancy-related hypertension incidence and BMI.

Just 2.5% of respondents in the control group developed hypertension, compared to 20% of case group members who had a high junk food consumption habit. Based on statistical test results, the p value is 0.002, indicating that there is a correlation between junk food consumption and pregnancy-related hypertension.

3.8% of respondents in the control group and 17.5% of respondents in the case group, respectively, reported having fewer than four prenatal visits during their pregnancy. Prenatal visits and pregnancy-related hypertension are related, as indicated by the variable's p value of 0.015.

Table 2 Bivariate Selection

Variable	p	Result
Maternal Age	0.016	Not a candidate
Parity	0.301	Candidate
Birth Interval	0.237	Candidate
BMI	1.000	Not a candidate
Junk food consumption	0.001	Candidate
Prenatal visits	0.013	Candidate

The bivariate selection results showed that all variables had p values <0.25, with the exception of parity and BMI, which had p values >0.25. Despite this, the parity and BMI variables were still subjected to multivariate analysis, as they are highly significant factors associated with the incidence of hypertension during pregnancy.

Table 3 Results of The First Multivariate Model

Variable	p	OR
Maternal Age	0.003	6.187
Birth Interval	0.017	3.949
Junk Food Consumption	0.003	13.405
Prenatal Visits	0.008	8.097
Parity	0.010	0.233
BMI	0.746	0.845

Multivariate modeling using logistic regression test by entering all independent variables in bivariate selection into multivariate analysis. The BMI variable was the variable with a p value >0.05 in the first modeling outcome. Additionally, the computation of the change in the OR value was done and the BMI variable was eliminated from the model due to its p value exceeding 0.05.

Table 4 Results of The Second Multivariate Model

Variable	p	OR	OR Change (%)
Maternal Age	0.003	6.045	2.2
Birth Interval	0.016	3.982	0.8
Junk Food Consumption	0.003	13.483	0.5
Prenatal Visits	0.008	7.899	2.4
Parity	0.010	0.236	1.2

The BMI variable was still eliminated since, according to the results of the OR value changes following the removal of BMI, there was no OR change greater than 10%.

Table 5 Results of The Finale Multivariate Model

Variable	p	OR
Maternal Age	0.003	5.886
Birth Interval	0.016	3.982
Junk Food Consumption	0.003	13.483
Prenatal Visits	0.008	7.899
Parity	0.010	0.236

There were no further variables with a p value >0.05 in the model once the BMI variable was eliminated permanently. The modeling was finished as a result. Based on the final multivariate modeling results, it was shown that parity, prenatal visits, junk food consumption, maternal age, and birth interval were the variables most substantially associated with the incidence of pregnancy hypertension.

With an OR value of 13.483, the junk food consumption habit variable emerged as the main factor influencing the prevalence of pregnancy hypertension after controlling for maternal age, birth interval, prenatal visits, and parity. This indicates that compared to pregnant women who have a tendency of consuming junk food ≤4 times per month, those who have a habit of consuming junk food >4 times per month have a 13.483 times higher likelihood of developing pregnancy hypertension.

4. Discussion

According to the findings of the Ardita Clinic's May–June 2018 study on hypertension in pregnancy, there were 40 cases (33.3%) and 80 participants (66.7%) who did not have hypertension throughout pregnancy. Relevant research indicates that hypertension during pregnancy is still a common occurrence and may be the reason for higher risks of maternal death. Study in showed that between 1990 and 2019, the global incidence of hypertensive disorders of pregnancy rose from 16.30 million to 18.08 million, representing a total rise of 10.92 % (8). Study in Indonesia also showed that 6.18% (558 persons) of pregnant women had hypertension when external variables that could have caused confounding factors were taken into account. West Java had the greatest rate of hypertension (10.57%) (9).

Compared to mothers whose maternal age is between 20 and 35 years, pregnant women whose age falls between 20 and 35 years are at 3.414 times higher risk of developing gestational hypertension. Previous research has indicated that moms who were 35–39 years old and 40–44 years old were at a 1.62 and 1.63 times higher risk of gestational hypertension, respectively, compared to mothers who were 25–30 years old (10). A correlation between maternal age and the occurrence of preeclampsia (p value 0.010; OR = 3.717) were also found in another research in Lampung, Indonesia (11). Maternal age significantly affects the incidence of pregnancy hypertension due to a combination of physiological, biological, and lifestyle factors. On teenage pregnancies, this is partly because the adolescent body is still developing, and there may be insufficient nutritional reserves and physiological maturity to support a healthy pregnancy. While as women age, there is a greater likelihood of having pre-existing health conditions such as chronic hypertension or diabetes, which can exacerbate pregnancy hypertension. Age-related vascular changes, such as decreased arterial elasticity and increased arterial stiffness, can also contribute to higher blood pressure during pregnancy.

The incidence of hypertension during pregnancy and parity did not correlate in this study. This is hypothesized to be the result of pregnant women actively attending prenatal visits despite having risky parities, which helps to prevent hypertension throughout pregnancy. Because medical professionals will provide pregnant women with guidance and assistance throughout prenatal visits to help them avoid and overcome any potential pregnancy and delivery difficulties. Other study in Flores, Indonesia also showed the different results with pregnant women with parity of more than 3 children are at risk of experiencing gestational hypertension 22.075 times compared to mothers pregnant with parity of less than 3 children to experience gestational hypertension (12). Mothers with parity > 3 children will experience changes in the uterine wall (uterus) that are weaker due to repeated pregnancies so that there will be a decrease in

blood flow in the mother's body which will have an impact on damage to the endothelial tissue in the blood vessels which can result in preeclampsia during pregnancy (13).

In this study, there was no relationship between the birth interval and the incidence of pregnancy hypertension. Other study found no significant association between the length of the birth interval and the incidence of pregnancy hypertension. This suggests that factors other than birth intervals may be more influential in determining the risk of hypertension during pregnancy (14). A meta-analysis study were also not establish a direct link between the length of interpregnancy intervals and an increased risk of pregnancy hypertension, indicating that while birth interval may affect other aspects of maternal and neonatal health, it does not directly correlate with hypertension (15).

The incidence of hypertension during pregnancy and BMI did not correlate in this study. This is believed to be the case even if obese pregnant women may actively do low-impact exercise to prevent pregnancy-related hypertension, such as yoga, brisk walking, speciality gymnastics, and swimming. This is the reason why fat has no bearing on the prevalence of hypertension during pregnancy. Most research indicates that there is a correlation between high BMI and an increased risk of pregnancy hypertension, but there were also study suggests that within certain BMI ranges, the correlation with hypertensive disorders of pregnancy is not significant. The research aims to show that while extreme BMI values (either high or low) are associated with increased risk, moderate BMI levels may not have a strong correlation with pregnancy hypertension (16). Another review study highlights variability in findings across different studies. Some studies confirm a significant correlation between high BMI and pregnancy hypertension, while others find no substantial association, particularly in specific BMI ranges (17).

Our research revealed that there is a chance of hypertension in expectant mothers who frequently eat junk food. Research into the impact of diet on pregnancy hypertension often highlights the role of junk food, which is typically high in sugar, salt, and unhealthy fats (18–20). These articles provide evidence supporting the correlation between junk food consumption and an increased risk of pregnancy hypertension. The high levels of salt, sugar, and unhealthy fats found in junk food contribute to the development of hypertension, making it a crucial dietary concern for pregnant women.

Compared to pregnant women who regularly attend prenatal checkups, those who visit the doctor seldom are 5,444 times more likely to experience gestational hypertension. Regular prenatal visits are associated with better management of hypertension during pregnancy. Increased monitoring helps in early detection and management of hypertension, reducing the risk of severe complications (21). Women who receive adequate prenatal care have a significantly lower risk of developing severe pregnancy hypertension. Regular visits facilitate early detection and intervention, which is crucial for managing blood pressure and preventing complications (22).

5. Conclusion

This study reveals that maternal age, junk food consumption, and prenatal visits contribute to the incidence of pregnancy related hypertension. The practice of eating junk food is the main variable associated with the prevalence of hypertension during pregnancy (OR 13.483). Any woman who desires a child should take the necessary precautions to ensure that she is in the optimal reproductive age range, refrain from eating junk food, and schedule regular prenatal visits. This reduces the possibility of difficulties for both the mother and the child.

Compliance with ethical standards

Disclosure of conflict of interest

All authors declare that no competing interests were disclosed.

Statement of ethical approval

Ethical clearance was approved by the Faculty of Medicine Universitas Respati, Jakarta, Indonesia (No. 27/KE/UNR/V/2018) on May 21st , 2018.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Badan Pusat Statistik. Mortalitas Di Indonesia. Mortalitas di Indonesia hasil Long Form Sensus Penduduk 2020. 2020.

[2] Garovic VD, Dechend R, Easterling T, Karumanchi SA, Baird SM, Magee LA, et al. Hypertension in Pregnancy : Diagnosis , Blood Pressure Goals , and Pharmacotherapy : Vol. 79, Hypertension. 2022. 21–41 p.

[3] Timpka S, Markovitz A, Schyman T, Mogren I, Fraser A, Franks PW, et al. Midlife development of type 2 diabetes and hypertension in women by history of hypertensive disorders of pregnancy. Cardiovasc Diabetol [Internet]. 2018;17(1):124. Available from: https://doi.org/10.1186/s12933-018-0764-2

[4] Catov JM, Countouris M, Hauspurg A. Hypertensive Disorders of Pregnancy and CVD Prediction: Accounting for Risk Accrual During the Reproductive Years ∗. J Am Coll Cardiol. 2018;72(11):1264–6.

[5] Gynecologists AC of O and. Preeclampsia and high blood pressure during pregnancy FAQ034 [Internet]. 2020. Available from: https://www.acog.org/womens-health/faqs/preeclampsia-and-high-blood-pressure-during-pregnancy

[6] Kight. RKLBP. Hypertension In Pregnancy. 2022; Available from: https://www.ncbi.nlm.nih.gov/books/NBK430839/

[7] Lieskusumastuti AD, Hanifah L. The Risks of Hypertension in Pregnant Women: A Meta-Analysis. 2022;721–34.

[8] Wang W, Xie X, Yuan T, Wang Y, Zhao F, Zhou Z, et al. Epidemiological trends of maternal hypertensive disorders of pregnancy at the global, regional, and national levels: a population-based study. BMC Pregnancy Childbirth. 2021;21(1):1–10.

[9] Sari NK, Rahayujati T, Hakimi M. Determinan gangguan hipertensi kehamilan di Indonesia. Ber Kedokt Masy [Internet]. 2016;32(9). Available from: https://jurnal.ugm.ac.id/bkm/article/view/12414

[10] Dietl A, Farthmann J. Gestational hypertension and advanced maternal age. Lancet [Internet]. 2015;386(10004):1627–8. Available from: http://dx.doi.org/10.1016/S0140-6736(15)00532-2

[11] Kusuma I, Yuliasari D, Fitria F, Keswara UR. Factors Affecting The Incidence Of Maternal Preeclampsia. JKM (Jurnal Kebidanan Malahayati). 2023;9(4):568–72.

[12] Lamak MRJ, Nayoan CR, Weraman P. Analysis of Risk Factors for Gestational Hypertension in Pregnant Women of the II And III Trimesters in the Coastal Area East Flores District. J Public Heal Trop Coast Reg. 2024;7(1):48–61.

[13] Syam AN, Tihardimanto A, Azis AA, Sari JI, Maidina S. Faktor Yang Berhubungan Dengan Kejadian Hipertensi Pada Ibu Hamil. Ibnu Sina J Kedokt dan Kesehat - Fak Kedokt Univ Islam Sumatera Utara. 2023;22(1):29–37.

[14] Zhang LN, Zhao XM, Zhao Y. Birth Interval and Risk of Pregnancy Hypertension: A Population-Based Study. J Matern Neonatal Med. 2016;

[15] Lee AMB, McAuliffe FM. Effect of Interpregnancy Interval on Maternal and Neonatal Outcomes: A Systematic Review and Meta-Analysis. Am J Obstet Gynecol. 2019;

[16] William W. Andrews, Sonia L. Hernandez AEB. Body Mass Index and the Risk of Hypertensive Disorders of Pregnancy: A Population-Based Study. Obstet Gynecol. 2019.

[17] Dunning, Patricia A. Geraghty KR. The Association between Body Mass Index and Hypertension in Pregnancy: A Systematic Review. J Matern Neonatal Med. 2017;

[18] Houghton SB, Smith KW, Harris JL. Maternal Diet and Pregnancy Hypertension: A Systematic Review and Meta-Analysis. Nutrients. 2020;

[19] Raghavan R, Dreibelbis C, Kingshipp BL, Wong YP, Abrams B, Gernand AD, et al. Dietary patterns before and during pregnancy and birth outcomes: A systematic review. Am J Clin Nutr. 2019;109:729S-756S.

[20] Chowdhury S, Chakraborty P pratim. Universal health coverage - There is more to it than meets the eye. J Fam Med Prim Care [Internet]. 2017;6(2):169–70. Available from: http://www.jfmpc.com/article.asp?issn=2249-4863;year=2017;volume=6;issue=1;spage=169;epage=170;aulast=Faizi

[21] Da Fonsêca Dutra GRS, Da Costa Dutra L, Da Fonsêca GKS, Do Nascimento MB, De Souza Lucena EE. Prenatal care and hypertensive gestational syndromes: A systematic review. Rev Bras Ginecol e Obstet. 2018;40(8):471–6.

[22] Barbosa IRC, Silva WBM, Cerqueira GSG, Novo NF, Novo JLVG, Almeida FA. Maternal and fetal outcome in women with hypertensive disorders of pregnancy: The impact of prenatal care. Ther Adv Cardiovasc Dis. 2015;9(4):140–6.